

REMARKS

The Amendment is submitted in response to a final Office Action mailed March 24, 2009. Claims 41, 42, 44, 45, 47-64, 66, 67, and 69-80 are currently pending in this application, with claims 50-62 and 72-80 withdrawn from consideration. Claims 41, 42, 49, 63, 64 and 71 stand provisionally rejected on the grounds of nonstatutory obviousness-type double patenting. Claims 41, 42, 44, 45, 47-49, 63, 64, 66, 67, and 69-71 stand rejected under 35 U.S.C. §103(a). Claims 44 and 66 are objected to under 37 CFR 1.74(c). In response, Applicants have amended claims 41, 44, 63, and 66. No new material has been added by way of these amendments. A Request for Continued Examination is filed herewith. The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

In the Office Action, the Patent Office has reasserted that the title of the invention is not descriptive, and that a new title is required that is clearly indicative of the invention to which the claims are directed. Specifically, the Patent Office has suggested that the title be amended to remain consistent with the terminology in the specification, such as anode material and battery. In response, Applicants have revised the title of the application to ANODE MATERIAL AND BATTERY.

In the Office Action, the Patent Office states that a number of claims are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting. Specifically, the Patent Office has provisionally rejected claim 63 in view of 11/267,641; claims 41, 42, 63, and 64 over 12/026,594; claims 41, 49, 63, and 71 over 11/268,010; claim 63 over 11/267,116; and claims 41, 42, 63 and 64 over 11/225,540. Applicants take note of these rejections. Applicants also note that neither this application or nor any of applications asserted by the Patent Office have been granted as a patent with issued claims. At such a time as either this application or any of the other applications issues as a patent, the remaining applications may be examined in view of the issued claims and any possible amendments made to the claims remaining in prosecution to determine if indeed an obviousness rejection is appropriate and if a terminal disclosure is required. Until that time, the rejections remain provisional.

In the Office Action, claims 44 and 66 are objected to under 37 CFR 1.75(c) as being of improper dependent format. Specifically, both depend from a cancelled claim. Claim 44 has

been amended to properly depend from claim 41, and claim 66 has been amended to properly depend from claim 63.

In the Office Action, claims 41, 42, 47-49, 63, 64, and 69-71 are rejected under §103(a) being unpatentable over JP 2000-311681 (hereinafter "Kawakami.") The Patent Office has agreed that the disclosure in Kawakami of anode materials only supplies the limitation of carbon in a Sn-Co anode material at weight percents of 0.8% by weight, 1.4% by weight, and 3.9% by weight. In the Office Action, claims 41, 42, 48, 49, 63, 64, 70, and 71 are also rejected under §103(a) as being unpatentable over WO 01/48840 (hereinafter "Dahn."). As in the rejection of Kawakami above, the Patent Office has agreed that the disclosure in Dahn only supplies the limitation of carbon in an Sn-metal anode of 4.0% weight. In both of these rejections, the Patent Office has asserted that while 5% to 50% weight is not expressly taught by either reference, it would have been obvious to one of ordinary skill in the art to modify that disclosure because obviousness of ranges that do not overlap may still exist if the ranges are close enough that one would not expect a difference in properties. Furthermore, the Patent Office asserts that there is no evidence of criticality in claimed range.

Applicants respectfully disagree with this assertion, and assert that the claimed range is non-obvious over the cited references. In particular, Applicants assert that they have demonstrated the range of carbon cited is critical and provides unexpected results. Specifically, claims 41 and 63 as amended, require a carbon ratio of from about 5% by weight to about 40% by weight. Applicants have offered this amendment because it more narrowly claims the range that contains the critical amount of carbon. Support for the upper range limit of 40% by weight can be found specifically in paragraph [0042]. Proof for the criticality of the claimed range can be found at numerous places throughout the specification and within the experimental section. However, Tables 6-1 and 6-2 on pages 37 and 38 of the specification as filed provide specific proof of this limitation. In Table 6-1, every variable for the anode materials is maintained nearly constant. Each anode material is composed of cobalt, tin, and carbon. The specific surface area is constant, as is median size and half value width. As shown in the table, capacity retention ratios reach 92% at 5 %wt carbon and 91% at 25 %wt, whereas at 2 %wt it's only 81%, and at 0.5% it's only 72%. Similarly, 40 %wt carbon has a capacity retention value of 85% whereas at 50 %wt carbon, the value drops to 75%. Table 6-2 also demonstrates the criticality of this value.

Values of 1.5 %wt carbon and 3 %wt carbon show capacity retention ratios of 65% and 78%, but an anode material 8 %wt carbon to about 45 %wt carbon shows capacity retention ratios of 85-89%.

Applicants also note that neither Dahn nor Kawakami teach or suggest the large amounts of carbon that this claimed invention covers. The anodes as claimed are composed of between 5% and 40% carbon, by mass, but when considering that the molecular weight of carbon is so much smaller than the metal or metalloids in the anode material, the atomic composition of these anodes requires a significant amount of carbon. By way of example, example 6-3 contains 30 %wt cobalt, 45 %wt tin, and 25 %wt carbon. This amount indicates that carbon represents 66% of the atoms in the anode material. In contrast, Dahn teaches that carbon is "optional" and Kawakami teaches that carbon is neither necessary nor required for its disclosure. The number of different atoms in Kawakami that can be present in the Sn.A.X formula for X is significant, and includes 39 other possible atoms besides carbon. Moreover, X is not even required, according to Kawakami.

Applicants also assert that Dahn teaches away from the claimed invention, and excludes the presumption of obviousness that the Patent Office attempts to assert based upon it. Specifically, Dahn states very clearly that the "particles [of the invention] having a single chemical composition" Page 2, ln. 7-8. Single chemical composition is clearly defined as the types of atoms that are detected on a nanometer scale is the same regardless of where the beam is placed. Page 2, ln. 23-26. Specific "intermetallic compounds" SnMn_3C and SnFe_3C are described in the specification. Applicants assert that this teaching indicates that one of ordinary skill in the art would not be motivated to prepare compounds such as $\text{SnMn}_3\text{C}_{1+x}$ because Dahn actually teaches a single chemical composition, not a range of carbons in the presence of tin and Mn or Fe.

For these reasons Applicants assert that independent claims 41 and 63 are valid and nonobvious over either Dahn or Kawakami. Applicants respectfully request that the rejections be withdrawn and the applications are in condition for allowance.

In the Office Action, the Patent Office also provides additional specific rejections to the claims as it relates to claims 42 and 64. Specifically, these two claims include the limitations that a peak of in an X-ray photoelectron spectrum is lower than about 284.5 eV. Applicants note

however that this rejection does not cure the issue of weight percentages present in independent claims 41 and 63. Moreover, Applicants also note that this limitation as claimed and specifically discussed within the specification at paragraphs [0033] to [0041] further emphasizes the significance of having carbon in the anode active material, a component that is described as “optional” by both Dahn and Kawakami.

In the Office Action, the Patent Office separately rejects claims 44, 45, 66 and 67 under §103(a) as being unpatentable over Kawakami. Claims 44 and 45 (and 66 and 67 with parallel limitations) require that the anode materials have an additional metal or metalloid in combination with tin and the at least one constituent. After relying on the arguments discussed above for independent claims 41 and 63, the Patent Office acknowledges that the specific claim limitations are not met by the Kawakami, but that the sets of elements required by these claims are present within Kawakami, and it would have been obvious to one of ordinary skill to try to form an alloy from this finite number of compounds. Applicants respectfully disagree and assert that, first, the species defined by the claims is much narrower than the genus the Examiner is asserting and, second, that the combination of two separate obviousness rejections, based on a single reference indicates that the Patent Office is improperly relying on the Applicants own disclosure.

First, the genus of compounds is enormously broad. The formula Sn.A.X , as described by Kawakami in the abstract, can include any known transition metal compound for A and 40 different elements for X. Of course, as noted above, X is optional. To put this number in context, there are about 30 transition metals in rows 3d to 5d, so $30 + 40 = 70$ elements that Kawakami teaches can be used. There are 112 “known” elements but only about 83 are stable. Five of those are noble gases and therefore uncreative, and two, Li and Sn, are excluded because they are already in the anode. This means that Kawakami teaches an anode material comprising Sn and some combination of 70 elements out of a possible 76 elements that are even an option. In contrast, the species defined by the claimed invention is an anode having tin, carbon, and a narrow selection of other elements. Dependent claims 44 and 66 in particular require tin, carbon, at least one of zinc, indium and silver, and at least one of nickel, copper, iron, cobalt and manganese. This specific species is much smaller than the genus the Patent Office asserts makes the species obvious. Applicants therefore assert that the rejection is improper and the species covered by claims 44, 45, 66 and 67 falls outside of the genus, as required by MPEP §2144.08.

Moreover, in order to reject claims 44, 45, 66, and 67, the Patent Office must argue, first, that the range while not covered is still obvious in view of the limited disclosure in Kawakami under MPEP § 2144.05 (Obviousness of Ranges,) and second, that the narrow set of compounds set forth by these claims is obvious in view of the large genus, as required by MPEP §2144.08. Applicants respectfully assert that this combination of dual obviousness rejections is improper. To reach the conclusion that an anode material having tin, carbon at 5 %wt to 40% wt, at least one of zinc, indium and silver, and at least one of nickel, copper, iron, cobalt and manganese is obvious over a reference that teaches neither that set of compounds nor the range of carbon, the Patent Office must be relying on the Applicants own disclosure to do so. Such reliance is improper.

For the reasons set forth above, Applicants respectfully assert that the claimed invention is not made obvious by the asserted prior art. Applicants request that the rejections be withdrawn and further submit that the present application is in condition for allowance.

Respectfully submitted,

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